HP Fibre Channel Fabric Migration Guide

Edition 5

HP Fibre Channel Mass Storage

Manufacturing Part Number: J2635-90014
E1201

United States

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Fabric Migration Guide

This document describes the fabric feature for the Fibre Channel PCI Tachyon TL, HSC TL and PCI XL2 host bus adapters. It lists the requirements you will need to take advantage of this feature along with any restrictions in using fabric.

Migrating to Fabric

A Fibre Channel fabric (one or more switches in a configuration) can provide multiple benefits including independent bandwidth per port, greater reliability, and increased performance.

Before you change your environment to a fabric supported environment, read the following sections carefully. They list the advantages and considerations of migrating to fabric, the requirements for fabric configurations, and examples of the configurations we support with the following host bus adapters:

- A5158A Fibre Channel PCI Tachyon TL
- A6684A Fibre Channel HSC Tachlite
- A6685A Fibre Channel HSC Tachlite
- A6795A Fibre Channel 1Gb/2Gb PCI Tachyon XL2

The configuration examples and some of the terminology we used are specific to the Brocade switch. We used this switch only as an example. HP also supports other switches. See the "Supported Platforms, Switches and Devices" link under Fibre Channel HBAs on our web site accessed through the ITRC. Log on to the ITRC web site (`http://itrc.hp.com`), and click on `navigate knowledge trees and response center FAQs`. In the Hardware area, navigate the links to `networks/mass storage connectivity/fibre channel/technical support`.

Important Considerations of Migrating to Fabric

When migrating from a private loop environment to a fabric environment, consider the following advantages.

Reliability

- Total removal of LIPs for N_Port (Direct Fabric Attach) devices results in the following:
  - — No LIP storms.
  - — No lost frames due to other devices going offline or coming online on the link.

    This activity can cause long delays (approximately 10 sec) while

the I/O is timed out and then retried for direct access devices. It can also cause a loss of position for sequential access devices, and the entire operation may need to be retried.

- Simpler link level protocol results in fewer chances of encountering hardware, firmware, or software defects in the HBAs.
- A fabric environment can provide multiple paths of communication between initiator and the target on the loop. If one path goes down because of loop port/link problems, the switch can determine an alternate path.

Manageability and Fault Isolation

- Switches contain management utilities which collect and present a broad range of statistical and error information. This information greatly assists in identifying specific components that are experiencing errors.
- Link level faults are isolated to a single link segment on a fabric.
- Target devices that are directly connected to the switch no longer need to have loop identifiers (Hard Physical Addresses) configured.

Performance

- Removal of FC-AL protocol for N_Port (DFA) devices.

  FC-AL protocol overhead is related to frame size and the number of members on the loop. FC-AL protocol can be quite significant for larger loop configurations (loops with more than 30 active nodes). When you move to a Direct Fabric Attach topology, the AL level of protocol is no longer needed or present.

- Addition of fabric routing time.

  Fabric routing times are generally less than 1 µsec (one microsecond). For single switch fabrics or properly configured cascaded switches, the fabric will have no noticeable effect on latency.

- Parallel transfer of data.

  Fabrics allow parallel transfers of data to and from multiple initiators on the fabric. They also allow parallel transfer of data to and from separate targets at the same time with a single initiator.

Scalability

- Fabrics allow you to expand beyond a single loop with a maximum of 126 loop ports to a SAN environment where it is possible to use multiple fabrics and attach virtually unlimited numbers of devices in several configurations.
- In addition to attaching devices directly to the fabric or having public loops in the SAN, you can attach an existing (but separate) private loop to the fabric, and have all of the devices managed by the fabric. This configuration creates a highly scalable and modular network of storage devices that you can extend as desired with minor effects to the existing network.

Sharing

Devices, such as tapes, that needed to be configured in a point-to-point configuration in a loop can now be shared with disk devices when they are in a fabric environment.

Device File Addressing Changes

Be aware of the following changes in your device files when you migrate to fabric:

- Device file names and iotree paths will change when you replace a private loop with a fabric switch.
- Device file names and iotree paths will change when you move a target device from one port on a fabric switch to another port on the switch.
- Device files and iotree nodes will change if the switch domain changes.

For more information on device file addressing changes, see the section “Fabric Device Addressing Changes” on page 16.

Requirements for Arbitrated Loop and Fabric Support

- A5158A PCI Tachyon TL adapter
  - — OS version HP-UX 11.00 or 11i

  - — A5158A HP-UX 11.00 or 11i software driver. The driver is available on the web at `http://www.software.hp.com` and on the HP-UX Application CD, AR0301 and later. The 11i driver is always installed with the HP-UX 11i Operating Environment.
  - — Tachyon patch PHKL_23939 or later for HP-UX 11.00
  - — Tachyon patch PHKL_23626 or later for HP-UX 11i
- A6684A and A6685A HSC Tachlite adapters
  - — OS version HP-UX 10.20, 11.00 or 11i
  - — A6684A/A6685A 10.20, 11.00 or 11i software driver. The driver is available on the web at `http://www.software.hp.com` and on the HP-UX Application CD, AR0601 and later. The 11i driver is always installed with the HP-UX 11i Operating Environment.
  - — J3630BA Fibre Channel Software Bundle (if not already installed, **for 10.20 only**)
  - — PHSS_23581 or later for HP-UX 10.20
  - — PHKL_17590 or later for HP-UX 10.20
  - — PHKL_16751 or later for HP-UX 10.20
  - — Tachyon patch PHKL_23939 or later for HP-UX 11.00
  - — Tachyon patch PHKL_23626 or later for HP-UX 11i
- A6795A PCI Tachyon XL2 adapter
  - — OS version HP-UX 11.00 and 11i
  - — A6795A HP-UX 11.00 or 11i software driver. The driver is available on the web at `http://www.software.hp.com` and on the HP-UX Application CD, AR1201 or later. The 11i driver is always installed with the HP-UX 11i Operating Environment.
  - — Tachyon patch PHKL_23939 or later for HP_UX 11.00
  - — Tachyon patch PHKL_23626 or later for HP-UX 11i
- Supported hardware

For the latest list of supported hardware and topologies, contact your HP representative, or visit the ITRC web site mentioned on page 6 in this manual.

Restrictions

- All target loop devices are required to continue using hard physical addressing.
- Remote device or LUN level scanning from IODC is not supported.
- `fcmsutil` option, `echo`, cannot be used in a fabric configuration.
- The maximum number of Tachyon TL hosts that HP recommends on an FL_Port is nine in non-HA configurations and four in HA configurations.

Supported Fabric Configurations

HP currently supports the following SAN configurations with the A5158A PCI Tachyon TL adapter, the A6684A and A6685A HSC Tachlite adapters and the A6795A PCI 2Gb XL2 adapter.

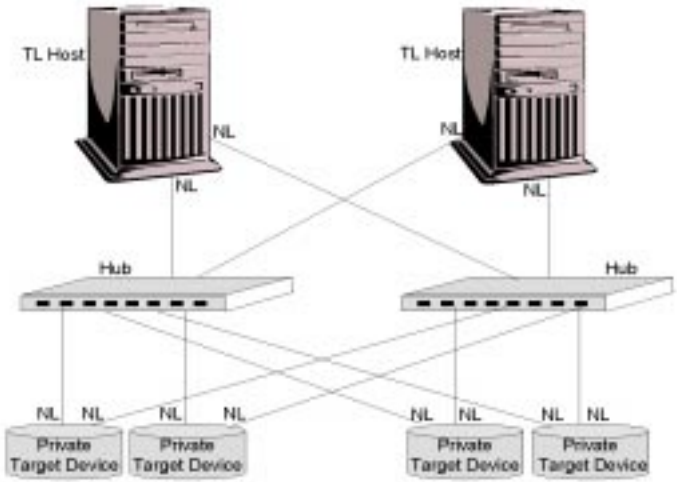
- Private Arbitrated Loop (with hubs)
- Direct Fabric Attachment
- Public Loop
- QuickLoop Fabric Attachment (with Brocade switches)
- QuickLoop Attachment for private devices (with Brocade switches)

For a list of supported platforms, switches and devices for these configurations, please contact your HP representative or visit the ITRC web site, mentioned on page 6, to access Fibre Channel HBA support information.

Isolated Private Arbitrated Loop

Figure 0-1 shows a typical Isolated Private Loop configuration without fabric. This is most likely your current configuration.

Figure 0-1 Isolated Private Arbitrated Loop Configuration



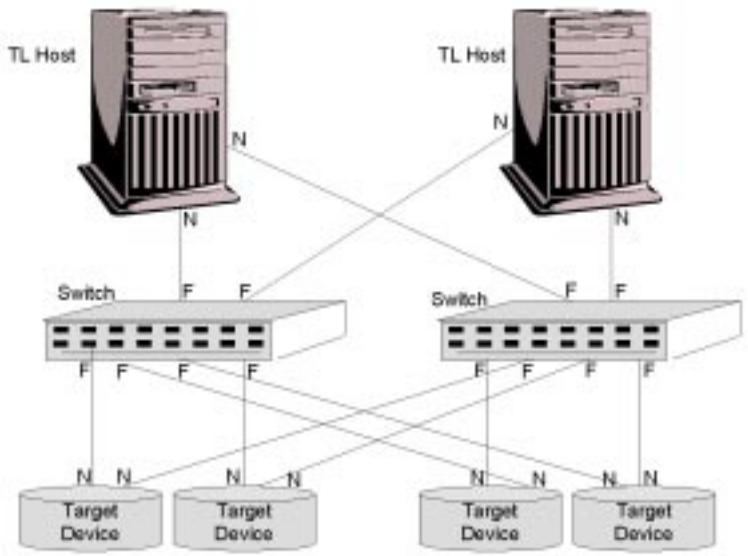
This isolated private loop is a typical configuration. It uses two hubs for some redundancy to the target devices. This configuration will continue to be supported.

Direct Fabric Attachment

A simple migration to a fabric configuration is to replace the two hubs with two Fibre Channel switches. Redundant paths to the targets are maintained while each link is isolated from each other providing better performance and reliability.

Figure 0-2 illustrates this fabric configuration.

Figure 0-2 Direct Fabric Attachment Configuration



The advantages of this configuration are:

- Additional cabling is unnecessary.
- All devices are isolated.
- Provides independent bandwidth for each device.

QuickLoop Attachment for Fabric

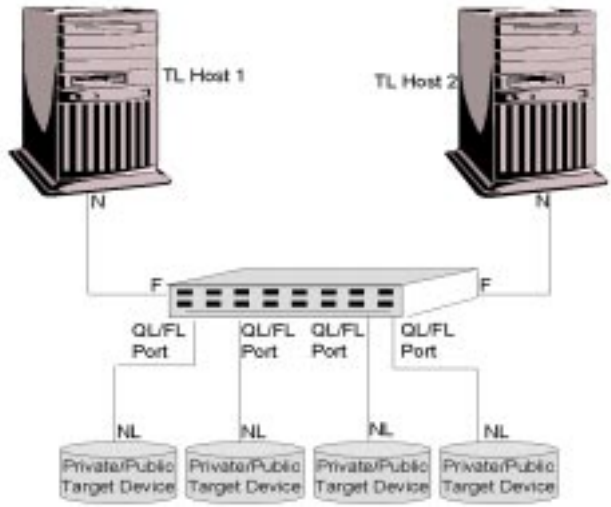
A migration path to a fabric configuration with devices that are not fabric capable is to use the QuickLoop fabric configuration. In this configuration, a host connected to a F_Port or FL_Port on the switch can communicate with private target devices connected to QL ports in the same or different loop. Through translative mode (a function of Brocade switch), the switch creates phantom loop addresses which allow private target devices to communicate with public hosts across the fabric. Translative mode allows private loop target devices to appear as public targets.

NOTE Translative mode does not allow private hosts to communicate with public devices on the switch.

An example of a QuickLoop fabric configuration is to replace the two hubs shown in the previous illustration with a single Fibre Channel switch. You can connect Host 1 and Host 2 to F_Ports on the switch, and connect each private target device to a QuickLoop port.

Figure 0-3 shows that Host 1 and Host 2 are now public hosts, each having access to any of the QuickLoop target devices through the translative mode function.

Figure 0-3 QuickLoop Fabric Configuration



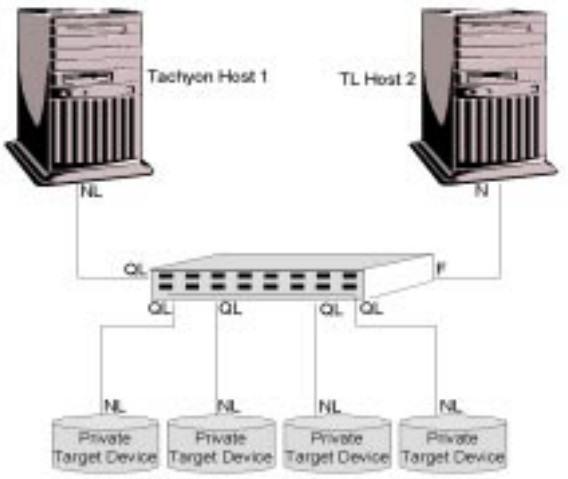
QuickLoop Attachment for Private Devices

NOTE The following configuration can be used when you are in the process of migrating to fabric but your fabric environment is not yet fully functional.

In a private loop environment, a QuickLoop configuration can allow private hosts with a Tachyon adapter attached to a QL_Port to access private devices on the loop by using the switch as a hub.

Figure 0-4 shows that Tachyon Host 1 is a private host which has access to the private target devices connected to a QuickLoop port. TL Host 2, a public host connected to a fabric port, also has access to the private devices and any future public devices.

Figure 0-4 QuickLoop Attachment for Private Devices



For Tachlite hosts:

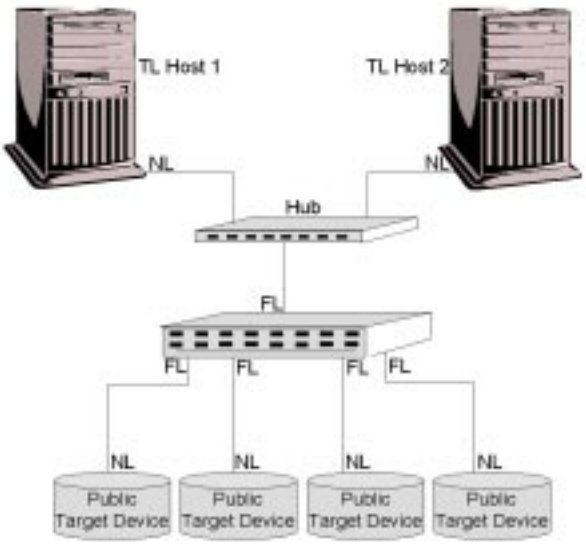
- Public hosts/devices cannot exist on a QL loop.
- Private QL hosts cannot connect to fabric devices.
- Public hosts connected to a QuickLoop port will behave as private hosts and therefore is not recommended or supported.

Public Loop

A public loop is an arbitrated loop where at least one of the ports on the loop is a switch port (FL_Port), which allows hosts or devices on the loop to communicate with hosts or devices attached to other FL_Ports.

Figure 0-5 shows that Host 1 and Host 2 are public hosts connected through a hub to an FL_Port on the switch. The target devices are public devices (NL_Ports) connected to other FL_Ports. Host 1 and 2 have access to any of the public devices.

Figure 0-5 Public Loop Attachment



To use this or any other configuration shown in this guide, check to see if your devices support the configuration. For a list of HP supported topologies and devices, visit the ITRC web site, mentioned on page 6, to access Fibre Channel HBA support information.

Fabric Device Addressing Changes

When you migrate from an existing Fibre Channel private loop configuration to a switched Fibre Channel fabric configuration, the hardware path to the attached target devices will change to reflect the presence of a fabric/switch in the route from the host initiator to the target device. When the I/O path information to a given disk changes, a new device file is created for this device.

Your system administrator will need to change the appropriate configuration files to allow the correct devices to be used by the file system or application that accesses these disk device files.

NOTE

Device file names and iotree paths will change when a fabric switch replaces a loop.

Device file names and iotree paths will change when you move a target from one port on a fabric switch to another port on the switch.

Device files and iotree nodes will change if the switch domain changes.

How to Make Configuration Changes

Check all references to device files. The two most common files to check are:

- `/etc/lvmtab`
- `/etc/fstab`

In all cases where you move an LVM device, you can use the `vgexport` and `vgimport` commands to easily migrate existing volume groups. Use `vgexport` to export your volume groups *before* changing your SAN configuration or installing the switch. Then use `vgimport` to import your volume groups using the new device files.

Please refer to the `vgexport` and `vgimport` man pages and to the LVM portions of your administrator's guides for details.

Device Addressing in a Fabric Environment

HP's current model of addressing associates devices with their hardware path information. In the case of Fibre Channel disk devices, the device file names are little more than tags that are associated with a node in the system iotree. Using the `ioscan` command, `ioscan -kfn -C disk`, you can obtain this association.

During the kernel initialization phase of the boot process, `ioscan` scans the hardware I/O subsystem for attached devices, and builds an iotree. Any new devices that are found during this scan process will have new device files created for them.

The current Fibre Channel implementation over a Private Arbitrated Loop uses the Hard Physical Address (HPA) of the FC target to generate a portion of the hardware path to the Fibre Channel port. Behind this port, virtual SCSI buses, targets and LUNs will exist.

In a fabric environment, the N_Port address is used to generate this portion of the hardware path to the Fibre Channel port. Behind this port, virtual SCSI buses, targets, and LUNs exist in the same manner as the existing configurations. The fabric/switch is responsible for the generation of the N_Port address. Three fields comprise this address:

Domain Generally associated with the physical instance of a switch. (To determine how the domain is assigned on a particular switch, refer to that switch vendor's documentation.)

Area Generally associated with a port on the switch.

Port Set to 0 for direct fabric attached devices (N_Port to F_Port).

Set to the AL_PA associated with the Hard Physical Address or loop identifier of a Fibre Channel target for public loop devices. (See the FC-AL-2 annex K for this mapping. Figure 0-6 shows an example of the annex K table).

For private loop devices, the port field(s) in the HW path in an `ioscan` output contains the Hard Physical Address or loop identifier of the target device.

Figure 0-6 Annex-K - Assigned Loop Identifier

AL_PA		Switch Setting	
Hex	Dec	Hex	Dec
EF	239	00	0
E8	232	01	1
E4	228	02	2
E2	226	03	3
E1	225	04	4
E0	224	05	5
DC	220	06	6
DA	218	07	7
D9	217	08	8
D6	214	09	9
D5	213	0A	10
D4	212	0B	11
D3	211	0C	12
D2	210	0D	13
D1	209	0E	14
CE	206	0F	15
CD	205	10	16
CC	204	11	17
CB	203	12	18
CA	202	13	19
C9	201	14	20
C7	199	15	21
C6	198	16	22
C5	197	17	23
C3	195	18	24
BC	188	19	25
BA	186	1A	26
B9	185	1B	27
B6	182	1C	28
B5	181	1D	29
B4	180	1E	30
B3	179	1F	31

AL_PA		Switch Setting	
Hex	Dec	Hex	Dec
B2	178	20	32
B1	177	21	33
AE	174	22	34
AD	173	23	35
AC	172	24	36
AB	171	25	37
AA	170	26	38
A9	169	27	39
A7	167	28	40
A6	166	29	41
A5	165	2A	42
A3	163	2B	43
9F	159	2C	44
9E	158	2D	45
9D	157	2E	46
9B	155	2F	47
98	152	30	48
97	151	31	49
90	144	32	50
8F	143	33	51
88	136	34	52
84	132	35	53
82	130	36	54
81	129	37	55
80	128	38	56
7C	124	39	57
7A	122	3A	58
79	121	3B	59
76	118	3C	60
75	117	3D	61
74	116	3E	62
73	115	3F	63

AL_PA		Switch Setting	
Hex	Dec	Hex	Dec
72	114	40	64
71	113	41	65
6E	110	42	66
6D	109	43	67
6C	108	44	68
6B	107	45	69
6A	106	46	70
69	105	47	71
67	103	48	72
66	102	49	73
65	101	4A	74
63	99	4B	75
5C	92	4C	76
5A	90	4D	77
59	89	4E	78
56	86	4F	79
55	85	50	80
54	84	51	81
53	83	52	82
52	82	53	83
51	81	54	84
4E	78	55	85
4D	77	56	86
4C	76	57	87
4B	75	58	88
4A	74	59	89
49	73	5A	90
47	71	5B	91
46	70	5C	92
45	69	5D	93
43	67	5E	94
3C	60	5F	95

AL_PA		Switch Setting	
Hex	Dec	Hex	Dec
3A	58	60	96
39	57	61	97
36	54	62	98
35	53	63	99
34	52	64	100
33	51	65	101
32	50	66	102
31	49	67	103
2E	46	68	104
2D	45	69	105
2C	44	6A	106
2B	43	6B	107
2A	42	6C	108
29	41	6D	109
27	39	6E	110
26	38	6F	111
25	37	70	112
23	35	71	113
1F	31	72	114
1E	30	73	115
1D	29	74	116
1B	27	75	117
18	24	76	118
17	22	77	119
10	16	78	120
0F	15	79	121
08	8	7A	122
04	4	7B	123
02	2	7C	124
01	1	7D	125

Reserved addresses:

00	0	7E	126
–	–	7F	127

Note that the values are from lowest to highest priority. AL_PA=00 is reserved for an FL_Port; “-” is not available.

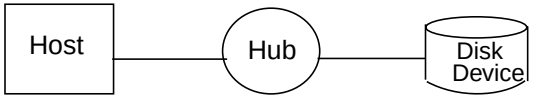
Because HP continues to use Physical Path addressing, loop devices (public and private) will be required to continue using Hard Physical Addresses.

Private Loop to Fabric Example

Following is a simple example of migrating an HP disk device from a private loop configuration to a fabric topology.

Figure 0-7 shows a private loop configuration.

Figure 0-7 Private Loop Configuration

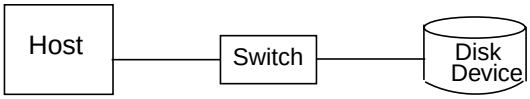


The ioscan output for a Private Loop Configuration could be as follows:

```
Class     I  H/W Path             Driver   S/W State   H/W Type       Description
----------------------------------------------------------------------------
fc        0  0/1/2/0              td        CLAIMED    INTERFACE    HP Tachyon
TL/TS Fibre Channel Mass Storage Adapter
fcp       1  0/1/2/0.8            fcp       CLAIMED    INTERFACE    FCP Protocol
Adapter
ext_bus   3  0/1/2/0.8.0.11.0     fcparray  CLAIMED    INTERFACE    FCP Array
Interface
target    6  0/1/2/0.8.0.11.0.0   tgt       CLAIMED    DEVICE
disk      3  0/1/2/0.8.0.11.0.0.0 sdisk     CLAIMED    DEVICE       HP OPEN-8
                                    /dev/dsk/c3t0d0    /dev/rdsk/c3t0d0
disk     10  0/1/2/0.8.0.11.0.0.7 sdisk     CLAIMED    DEVICE       HP OPEN-8
                                    /dev/dsk/c3t0d7    /dev/rdsk/c3t0d7
target    7  0/1/2/0.8.0.11.0.1   tgt       CLAIMED    DEVICE
disk     18  0/1/2/0.8.0.11.0.1.7 sdisk     CLAIMED    DEVICE       HP OPEN-9
                                    /dev/dsk/c3t1d7    /dev/rdsk/c3t1d7
```

Figure 0-8 shows a Direct Fabric Attachment configuration.

Figure 0-8 Direct Fabric Attachment Configuration



The ioscan output for this configuration could be as follows:

```
Class     I  H/W Path             Driver   S/W State   H/W Type    Description
----------------------------------------------------------------------------
fc        0  0/1/2/0              td       CLAIMED     INTERFACE   HP Tachyon
TL/TS Fibre Channel Mass Storage Adapter
fcp       1  0/1/2/0.1            fcp      CLAIMED     INTERFACE   FCP Domain
ext_bus   3  0/1/2/0.1.19.0.0     fcparray CLAIMED     INTERFACE   FCP Array
Interface
target    6  0/1/2/0.1.19.0.0.0   tgt      CLAIMED     DEVICE
disk      3  0/1/2/0.1.19.0.0.0.0 sdisk    CLAIMED     DEVICE      HP OPEN-8
                                  /dev/dsk/c4t0d0    /dev/rdsk/c4t0d0
disk     10  0/1/2/0.1.19.0.0.0.7 sdisk    CLAIMED     DEVICE      HP OPEN-8
                                  /dev/dsk/c4t0d7    /dev/rdsk/c4t0d7
target    7  0/1/2/0.1.19.0.0.1   tgt      CLAIMED     DEVICE
disk     18  0/1/2/0.1.19.0.0.1.7 sdisk    CLAIMED     DEVICE      HP OPEN-9
                                  /dev/dsk/c4t1d7    /dev/rdsk/c4t1d7
```

Looking at the iotree examples, you can see the following:

- There has been no change to the adapter path or the associated device file which is used for the `fcmsutil` diagnostic tool.
- The node `0/1/2/0.8`, FCP Protocol Adapter, is in both ioscan output files. In a private loop configuration, the interface and target devices will reside behind this node. In a fabric environment, this node may be created as a dummy node generated by the scan logic if the HBA is scanned when it cannot see the fabric (for example, no cable attached, switch down, etc.).

  In the original Private Loop implementation of the Fibre Channel driver, this node of the iotree was used to indicate the Fibre Channel FC4 “TYPE”. A type of “8” denotes that the FCP protocol is being used to encapsulate the SCSI protocol. With the introduction of fabric, this node contains the domain portion of the N_Port address. To maintain backward compatibility, the domain of 8 is reserved for use with Private Loop devices.

CAUTION Do not configure switches with a domain of 8. This configuration is unsupported and will not work. HP systems reserve domain 8 for Private Loop devices.

- The fabric configuration now contains an iotree node of `0/1/2/0.1` described as FCP Domain. A node of this type will be built for each domain the fabric contains. (Domains generally correspond one to one with a physical instance of a switch).
- The FCP Array Interface iotree node has changed from `0/1/2/0.8.0.11.0` to `0/1/2/0.1.19.0.0`. The address is still at hardware path `0/1/2/0`, but the next three elements of the path, which represent the N_Port ID, have changed. The old N_Port ID of `8.0.11` uses the reserved domain of 8 and area of 0. In this case, the HPA or Port portion of the N_Port ID is 11. In the fabric iotree, the new N_Port ID is `1.19.0`. This N_Port ID corresponds to the following:

  — domain ID of 1 = Brocade switch #1

  — area ID of 19 = port 3

  — port ID of 0 = Direct Fabric Attach

  In the ioscan example, the area ID is 19. The switch will show a hexadecimal value of “1x” because it has a fixed “1” in the upper four bits of the area field (0001xxxx). However, ioscan shows a decimal value for this field. Therefore, you must subtract decimal 16 from the number 19 to get the actual port number, which is 3.

  For most switches, the domain ID generally will map to a switch. An area ID will map to a physical connector on the switch. This mapping may not be a direct numerical correlation; that is, physical port “3” may map to an area ID other than “3,” depending on the decimal value shown in this field.

  If the switch port is an F_Port (Direct Fabric Attach), the port ID is set to 0. If the switch port is an FL_Port, the port ID is set to the AL_PA associated with the Hard Physical Address or loop identifier of a Fibre Channel target for public loop devices. The AL_PA is then used as the Port portion of the iotree address.

- All targets and disk devices retain their original iotree addresses except for the new fabric N_Port address which is substituted for the old Arbitrated Loop address.
- New device files will be generated for the new iotree nodes. The old device files will continue to exist until they are removed with the `rmsf` command or a system reboot.

Glossary

A

AL Boot - the process of booting from a device that is on the same arbitrated loop as the host adapter. No switch is required.

Arbitrated Loop - a Fibre Channel topology where information is routed around the loop from port to port until it arrives at its destination. This is a private loop configuration.

Area - the second field of the 3-byte address assigned to an attached N_Port in a Fabric configuration. The Area is generally associated with an F/FL port on a switch.

C

Cascading - an interconnection of individual switches used to create larger Fabric configurations.

D

DFA (Direct Fabric Attachment) - a configuration in which both the host initiator and the target device are attached to the same switch (N_Port to F_Port).

Domain - the first field of the 3-byte address assigned to an attached N_Port in a Fabric configuration. The domain is generally associated with an instance of the switch.

F

Fabric - a term used to describe an interconnection of Fibre Channel host ports, device ports and switch ports where frames from a source N_Port are routed through a switch (Fabric) to a destination N_Port based on the frame's destination address.

Fabric Boot - the process of booting from a device that is accessed by a Fibre Channel switch.

Fabric Device Addressing - the assigning of addresses to attached N_Ports in the Fabric. The address is determined by the switch and is comprised of three fields: Domain, Area, and Port.

FC-FLA (Fibre Channel Fabric Loop Attach) - the ANSI technical report that describes the rules by which NL_Ports and FL_Ports communicate with each other.

FC-AL - (Fibre Channel Arbitrated Loop) - the ANSI standard that describes how several Fibre Channel ports can share a single communication ring.

F_Port (Fabric Port) - a port within the Fabric used to route frames from N_Port to N_Port. The F_Port is the access point to a Fibre Channel switch.

FC-SW (Fibre Channel Switch Fabric) - the standard that describes how Fibre Channel switches are required to behave.

FC-GS - (Fibre Channel Generic Service) - the ANSI standard that describes such services as the directory service that allows a host to identify which storage devices are available and their addresses.

FL_Port - an F_Port that is attached to the Fabric in a loop configuration.

I

IODC (Input/Output Dependent Code) - firmware that implements a simplified driver for an adapter card. It is analogous to card BIOS in a PC. IODC is included in the PDC (Processor Dependent Code). *See also PDC.*

L

LIP (Loop Initialization Primitive) used to initiate a procedure on the loop. This initialization state usually causes activity on the loop to suspend briefly. It can be caused by new devices being added or moved on the loop, arbitrated loop address assignment, recovery from loop failure, or resetting a node.

N

N_Port - a node port (or device port) used to route information to or from other nodes or to devices. The N_Port is the access point to a Fibre Channel adapter.

NL_Port - an N_Port that is attached to the Fabric in a loop configuration.

P

PDC (Processor Dependent Code) - firmware that hides machine differences and integrates and calls IODC to allow the system to boot. It is analogous to system BIOS in a PC. *See also IODC.*

Port - the third field of the 3-byte address assigned to an attached N_Port in a Fabric configuration.

The port is generally associated with the Hard Physical Address (HPA) of a Fibre Channel target device.

Private Loop - an arbitrated loop that has no attached switch port. Private loop devices can only communicate with other devices on the same loop (except in translative mode). *See also Translative Mode and Arbitrated Loop.*

Public Loop - a topology in which an arbitrated loop is connected to a switch through an FL_Port which allows hosts or devices on the loop to communicate with hosts or devices attached to other FL_Ports.

Q

QL_Port - a Fabric port in a QuickLoop configuration that routes information from a QuickLoop switch to a target device connected to an NL_Port.

QuickLoop Configuration - an emulated private loop configuration that allows private hosts on Fabric-attached loops to access private target devices across the switch. This configuration can consist of multiple private Arbitrated Loops that are interconnected and may be isolated by the switch (this is a feature of the Brocade switches).

T

TMWQL Translative Mode with QuickLoop

Translative Mode - a technique by which a switch allows public hosts on a private loop connected to a fabric to communicate with private target devices. In translative mode, these private target devices operate as public devices.

Z

Zoning - a logical grouping of Fabric-attached devices that are isolated from other devices and other zones by the switch.